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tion, factory floor, etc.).

(77) A portable laptop implementation can be made to deliver multimedia mail with video, audio and synchronized annotations via CD-ROM or an add-on videotape unit with separate video, audio and time code tracks (a stereo videotape player can use the second audio channel for time code signals). Videotapes or CD-ROMs can be created in main offices and express mailed, thus
avoiding the need for high-bandwidth networking when on the road. Cellular phone links can be used to obtain both voice and data communications (via modems). Modem-based data communications are sufficient to support remote control of mail or presentation playback, annotation, file transfer and fax features. The laptop can then be brought into the office and attached to a docking station where the available MLAN 10 and additional functions adapted from Add-on box 800 can be supplied, providing full CMW capability.

(78) COLLABORATIVE MULTIMEDIA WORKSTATION SOFTWARE

(79) CMW software modules 160 are illustrated generally in FIG. 20 and discussed in greater detail below in conjunction with the software running on MLAN Server 60 of FIG. 3. Software 160 allows the user to initiate and manage (in conjunction with the server software) videoconferencing, data conferencing, multimedia mail and other collaborative sessions with other users across the network.

(80) Also present on the CMW in this embodiment are standard multitasking operating system/GUI software 180 (e.g., Apple Macintosh System 7, Microsoft Windows 3.1, or UNIX with the "X Window System" and Motif or other GUI "window
manager" software) as well as other applications 170, such as word processing and spreadsheet programs. Software modules 161-168 communicate with operating
system/GUI software 180 and other applications 170 utilizing standard function calls and interapplication protocols.

(81) The central component of the Collaborative Multimedia Workstation software is the Collaboration Initiator 161. All collaborative functions can be accessed through this module. When the Collaboration Initiator is started, it exchanges initial configuration information with the Audio Video Network Manager (AVNM) 60 (shown in FIG. 3) through Data Network 902. Information is
also sent from the Collaboration Initiator to the AVNM indicating the location of the user, the types of services available on that workstation (e.g.,

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(via the ADD
button in Collaboration Initiator window 204) to provide additional information
regarding the factual history of the security. Upon selecting the ADD button,
video window 203 now displays, as illustrated in FIG. 38, a video mosaic
consisting of three smaller images (instead of a single large image displaying
only caller 231) of the Expert 233, caller 231 and London expert 232.

(225)   During this videoconference, an urgent PRIORITY request (New Call
window 234) is received from the Expert's boss (who is engaged in a three-party
videoconference call with two members of the bank's operations department and
is attempting to add the Expert to that call to answer a quick question). The
Expert puts his three-party videoconference on hold (merely by clicking the
HOLD button in video window 203) and accepts (via the ACCEPT button of New
Call
window 234) the urgent call from his boss, which results in the Expert being
added to the boss' three-party videoconference call.

(226)   As illustrated in FIG. 39, video window 203 is now replaced with a
four-person video mosaic representing a four-party conference call consisting
of the Expert 233, his boss 241 and the two members 242 and 243 of the bank's
operations department. The Expert quickly answers the boss' question and, by
clicking on the RESUME button (of video window 203) adjacent to the names of
the other participants to the call on hold, simultaneously hangs up on the
conference call with his boss and resumes his three-party conference call
involving the securities issue, as illustrated in video window 203 of FIG. 40.

(227)   While that call was on hold, however, analyst 231 and London expert 232
were still engaged in a two-way videoconference (with a blackened portion of
the video mosaic on their screens indicating that the Expert was on hold) and
had shared and annotated a graphical image 250 (see annotations 251 to image
250 of FIG. 40) illustrating certain financial concerns. Once the Expert
resumed the call, analyst 231 added the Expert to the share session, causing
Share window 211 containing annotated image 250 to appear on the Expert's
screen. Optionally, snapshot sharing could progress while the video was on
hold.

(228)   Before concluding his conference regarding the securities, the Expert
receives notification of an incoming multimedia mail message--e.g., a beep
accompanied by the appearance of an envelope 252 in the dog's mouth in In
Box
icon 205 shown in FIG. 40. Once he concludes his call, he quickly scans his
incoming multimedia mail message by clicking on In Box icon 205, which
invokes

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IG. 18A. Currently available personal computers (e.g., an Apple Macintosh or an IBM-compatible PC, desktop or laptop) and workstations (e.g., a Sun SPARCstation) can be adapted to work with the present invention to provide such features as real-time videoconferencing, data conferencing, multimedia mail, etc. In business situations, it can be advantageous to set up a laptop to operate with reduced functionality via cellular telephone links and removable storage media (e.g., CD-ROM, video tape with timecode support, etc.), but take on full capability back in the office via a docking station connected to the MLAN 10. This requires a voice and data modem as yet another function server attached to the MLAN.

(60) The currently available personal computers and workstations serve as a base workstation platform. The addition of certain audio and video I/O devices to the standard components of the base platform 100 (where standard components include the display monitor 200, keyboard 300 and mouse or tablet (or other pointing device) 400), all of which connect with the base platform box through standard peripheral ports 101, 102 and 103, enables the CMW to generate and receive real-time audio and video signals. These devices include a video camera 500 for capturing the user's image, gestures and surroundings (particularly the user's face and upper body), a microphone 600 for capturing the user's spoken words (and any other sounds generated at the CMW), a speaker 700 for presenting incoming audio signals (such as the spoken words of another participant to a videoconference or audio annotations to a document), a video input card 130 in the base platform 100 for capturing incoming video signals (e.g., the image of another participant to a videoconference, or videomail), and a video display card 120 for displaying video and graphical output on monitor 200 (where video is typically displayed in a separate window).

(61) These peripheral audio and video I/O devices are readily available from a variety of vendors and are just beginning to become standard features in (and often physically integrated into the monitor and/or base platform of) certain personal computers and workstations. See, e.g., the aforementioned BYTE article ("Video Conquers the Desktop"), which describes current models of Apple's Macintosh AV series personal computers and Silicon Graphics' Indy workstations.

(62) Add-on box 800 (shown in FIG. 18A and illustrated in greater detail in FIG. 19) integrates these audio and video I/O devices with additional functions (such as adaptive echo canceling and signal switching) and interfaces with AV Network 901. AV Network 901 is the part of the MLAN 10 which carries

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esponse thereto, the AVNM causes the A/V Switching Circuitry 30 to set up the appropriate connections between ports 81 and 82, as indicated by the dashed line 83.

[0152] FIG. 25 diagrammatically illustrates how two-party calls are connected for CMWs WS-1 and WS-2 when located in different MLANs 10a and 10b. As illustrated in FIG. 25, CMW WS-1 of MLAN 10a is connected to a port 91a of A/V
Switching Circuitry 30a of MLAN 10a, while CMW WS-2 is connected to a port 91b
of the A/V Switching Circuitry 30b of MLAN 10b. It will be assumed that MLANs 10a and 10b can communicate with each other via ports 92a and 92b (through respective WAN gateways 40a and 40b and WAN 15). A call between CMWs WS-1 and
WS-2 can then be established by AVNM of MLAN 10a in response to the creation of
callhandles at ports 91a and 92a, setting up appropriate connections between these ports as indicated by dashed line 93a, and by AVNM of MLAN 10b, in response to callhandles created at ports 91b and 92b, setting up appropriate connections between these ports as indicated by dashed line 93b. Appropriate paths 94a and 94b in WAN gateways 40a and 40b, respectively, are set up by the
WAN network manager 65 (FIG. 21) in each network.

Conference Calls

[0153] Next to be described is the specific manner in which the preferred embodiment provides for multi-party conference calls (involving more than two participants) When a multi-party conference call is initiated, the CMW provides a screen that is similar to the screen for two-party calls, which displays a live video picture of the callee's image in a video window. However, for multi-party calls, the screen includes a video mosaic containing a live video picture of each of the conference participants (including the CMW user's own picture), as shown, for example, in FIG. 8B. Of course, other embodiments could show only the remote conference participants (and not the local CMW user)
in the conference mosaic (or show a mosaic containing both participants in a two-party call). In addition to the controls shown in FIG. 8B, the multi-party conference screen also includes buttons/menu items that can be used to place individual conference participants on hold, to remove individual participants from the conference, to adjourn the entire conference, or to provide a "close-up" image of a single individual (in place of the video mosaic).

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es. Also note that Site #2 and Site #3 are each required to transmit two different types of cut-and-paste mosaics.

[0100] The preferred embodiment also provides the capability of allowing a conference participant to select a close-up of a participant displayed on a mosaic. This capability is provided whenever a full individual video picture is available at that user's site. In such case, the A/V Switching Circuitry 30 (FIG. 3) switches the selected full video picture (whether obtained locally or from another site) to the CMW that requests the close-up.

[0101] Next to be described in connection with FIGS. 18A, 18B, 19 and 20 are various preferred embodiments of a CMW in accordance with the invention.

Collaborative Multimedia Workstation Hardware

[0102] One embodiment of a CMW 12 of the present invention is illustrated in FIG. 18A Currently available personal computers (e.g., an Apple Macintosh or an
IBM-compatible PC, desktop or laptop) and workstations (e,g., a Sun SPARC station) can be adapted to work with the present invention to provide such features as real-time videoconferencing, data conferencing, multimedia mail, etc. In business situations, it can be advantageous to set up a laptop to operate with reduced functionality via cellular telephone links and removable storage media (e.g., CD-ROM, video tape with timecode support etc.), but take on full capability back in the office via a docking station connected to the MLAN 10. This requires a voice and data modem as yet another function server attached to the MLAN.

[0103] The currently available personal computers and workstations serve as a base workstation platform. The addition of certain audio and video I/O devices to the standard components of the base platform 100 (where standard components
include the display monitor 200, keyboard 300 and mouse or tablet (or other pointing device) 400), all of which connect with the base platform box through standard peripheral ports 101, 102 and 103, enables the CMW to generate and receive real-time audio and video signals. These devices include a video camera 500 for capturing the user's image, gestures and surroundings (particularly the user's face and upper body), a microphone 600 for capturing the user's spoken words (and any other sounds generated at the CMW), a speaker
700 for presenting incoming audio signals (such as the spoken words of another participant to a videoconference or audio annotations to a document), a video input card 130

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Side Mount 850 eliminates
the necessity of external connections to these integrated audio and video I/O
devices, and includes an LCD display 810 for displaying the incoming video
signal (which thus eliminates the need for a base platform video input card
130).

[0119] Given the proximity of Side Mount device 850 to the user, and the direct
access to audio/video I/O within that device, various additional controls 820
can be provided at the user's touch (all well within the capabilities of those
skilled in the art). Note that, with enough additions, Side Mount unit 850 can
become virtually a standalone device that does not require a separate computer
for services using only audio and video. This also provides a way of
supplementing a network of full-feature workstations with a few low-cost
additional "audio video intercoms" for certain sectors of an enterprise (such
as clerical, reception, factory floor, etc.).

[0120] A portable laptop implementation can be made to deliver multimedia mail
with video, audio and synchronized annotations via CD-ROM or an add-on
videotape unit with separate video, audio and time code tracks (a stereo
videotape player can use the second audio channel for time code signals).
Videotapes or CD-ROMs can be created in main offices and express mailed,
thus
avoiding the need for high-bandwidth networking when on the road. Cellular
phone links can be used to obtain both voice and data communications (via
modems) Modem-based data communications are sufficient to support remote
control of mail or presentation playback, annotation, file transfer and fax
features. The laptop can then be brought into the office and attached to a
docking station where the available MLAN 10 and additional functions adapted
from Add-on box 800 can be supplied, providing full CMW capability.

Collaborative Multimedia Workstation Software

[0121] CMW software modules 160 are illustrated generally in FIG. 20 and
discussed in greater detail below in conjunction with the software running on
MLAN Server 60 of FIG. 3 Software 160 allows the user to initiate and manage
(in conjunction with the server software) videoconferencing, data conferencing,
multimedia mail and other collaborative sessions with other users across the
network.

[0122] Also present on the CMW in this embodiment are standard multitasking
operating system/GUI software 180 (e.g., Apple Macintosh System 7, Microsoft
Windows 3.1, or UNIX with the "X Window System" and Motif or other GUI
"window

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ine 93a, and by AVNM of
MLAN 10b, in response to callhandles created at ports 91b and 92b, setting up
appropriate connections between these ports as indicated by dashed line 93b.
Appropriate paths 94a and 94b in WAN gateways 40a and 40b, respectively are
set
up by the WAN network manager 65 (FIG. 21) in each network.

(115)   CONFERENCE CALLS

(116)   Next to be described is the specific manner in which the preferred
embodiment provides for multi-party conference calls (involving more than two
participants). When a multi-party conference call is initiated, the CMW
provides a screen that is similar to the screen for two-party calls, which
displays a live video picture of the callee's image in a video window.
However, for multi-party calls, the screen includes a video mosaic containing a
live video picture of each of the conference participants (including the CMW
user's own picture), as shown, for example, in FIG. 8B. Of course, other
embodiments could show only the remote conference participants (and not the
local CMW user) in the conference mosaic (or show a mosaic containing both
participants in a two-party call). In addition to the controls shown in FIG.
8B, the multi-party conference screen also includes buttons/menu items that can
be used to place individual conference participants on hold, to remove
individual participants form the conference, to adjourn the entire conference,
or to provide a "close-up" image of a single individual (in place of the video
mosaic).

(117)   Multi-party conferencing requires all the mechanisms employed for
2-party calls. In addition, it requires the conference bridge manager CBM 64
(FIG. 21) and the conference bridges 36 (FIG. 3). The CBM acts as a client of
the AVNM in managing the operation of the conference bridges 36. The CBM
also
acts a server to other clients on the network. The CBM makes conferencing
services available by creating service records of type "conference" in the AVNM
service database and associating these services with the ports on A/V Switching
Circuitry 30 for connection to conference bridges 36.

(118)   The preferred embodiment provides two ways for initiating a conference
call. The first way is to add one or more parties to an existing two-party
call. For this purpose, an ADD button is provided by both the Collaboration
Initiator and the Rolodex, as illustrated in FIGS. 2A and 22. To add a new
party, a user selects the party to be added (by clicking on the user's rolodex
name or face icon as described above) and clicks on the ADD button to invite
that new party. Additional parties can be invited in a similar manner. The